

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: B. Kim Attorney Docket No.: SEMT116964  
Application No.: 10/687,112 Art Unit: 1792 / Confirmation No: 7221  
Filed: October 15, 2003 Examiner: B.K. Talbot  
Title: PROCESSES AND TOOLS FOR FORMING LEAD FREE ALLOY  
SOLDER PRECURSORS

RESPONSE AFTER NONFINAL REJECTION

Seattle, Washington 98101

July 23, 2008

TO THE COMMISSIONER FOR PATENTS:

Applicant submits the remarks that follow as a response to the Examiner's Action mailed April 23, 2008.

Claims 1-26 and 42 are currently pending and active in the application. Claims 1-26 and 42 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,013,572 to Hur et al., in combination with U.S. Patent No. 5,773,359 to Mitchell et al., and further in combination with U.S. Patent Application Publication No. 2004/0040855 to Batinovich. For the following reasons, applicant respectfully traverses this rejection.

To establish a *prima facie* case of obviousness, the cited prior art references must teach or suggest all of the claim elements. In addition, there must be some apparent reason, either in the references or in the knowledge of one skilled in the art, to modify the references or to combine the elements of multiple references with a reasonable expectation of success.

Independent Claims 1, 11, 16, and 21 generally recite a process of forming a solder alloy precursor on a microelectronic workpiece having a conductive under bump metallurgy (UBM). The process recited in each of these claims includes forming a second barrier layer on exposed

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portions of the conductive under bump metallurgy, wherein the second barrier layer is a diffusion barrier layer.

The Examiner's Action acknowledges that Hur et al. fails to teach forming a diffusion barrier layer on a UBM layer underneath a solder material. Relying upon Mitchell et al., the Examiner's Action, on page 4, concludes that it would have been obvious for one skilled in the art to have modified Hur et al. to incorporate a barrier/diffusion layer above the Hur et al. UBM layer and beneath a solder material.

Mitchell et al. is generally directed to an interconnect system including an interconnect bump over an under bump metallurgy and a method of fabricating the same. As noted on page 3, the Examiner's Action recognizes Mitchell et al. describes an under bump metallurgy (25 in Figure 1 of Mitchell et al.) including three layers: a barrier layer 26 (e.g., titanium, tungsten, nickel, or chrome); an adhesion layer 28 (e.g., copper); and a mixture layer 27, which is a mixture (e.g., titanium, copper) of the metal of the barrier layer 26 and the metal of the adhesion layer 28 to serve as a transition layer between layers 26 and 28.

Applicant thanks the Examiner for his time on May 14, 2008, to clarify the Examiner's interpretation of Mitchell et al. Applicant understands that the modification to Hur et al. proposed in the first paragraph on page 4 of the Examiner's Action involves incorporating barrier layer 26 of Mitchell et al. onto the UBM 14 of Hur et al.

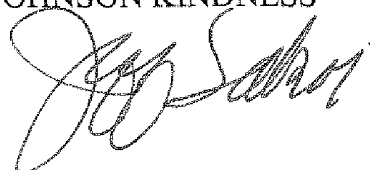
Mitchell et al. teaches a barrier layer 26 that is an integral element of UBM layer 25. Mitchell et al. does not teach or suggest using barrier layer 26 and forming a second barrier layer on an underlying UBM, as recited in independent Claims 1, 11, 16, and 21. Applicant asserts that interpreting the combination of Hur et al. and Mitchell et al. as teaching the use of barrier layer 26 to form a second barrier layer on an underlying UBM involves impermissible hindsight analysis using applicant's own disclosures against them.

For at least these reasons, applicant submits that Mitchell et al. fails to cure the deficiency of Hur et al. and therefore the subject matter of Claims 1, 11, 16, and 21 and the claims dependent therefrom is patentable over Hur et al. in view of Mitchell et al. and Batinovich. Accordingly, applicant respectfully requests withdrawal of the outstanding rejection of Claims 1-26 and 42.

If the Examiner has any questions regarding the foregoing, the Examiner is invited to contact the applicant's attorney at the number listed below so that any outstanding issues can be resolved in a timely and efficient manner.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Jeff Sakoi", written over the printed name.

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